

SUPPORT FOR AMENDMENTS

For ease of discussion, reference will be made to the publication of the present application, US 2006/0217484 ("US '484"), rather than the specification as filed for support and for the discussion that follows. Claims 21-27 have been newly added; support can be found in US '484:

- Claims 21-23: [0040]-[0041];
- Claim 24-25: [0036];
- Claim 26: [0052]; &
- Claim 27: [0034].

No new matter has been added.

REMARKS/ARGUMENTS

The present claims relate to emulsions characterized by a "factor *a*" of at least 0.3, which cannot be found in the reference cited against the claims.

Rejection under 35 U.S.C. § 102/103

The rejection of Claims 1-5 and 13-20 under 35 U.S.C. §102(b) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over "Poly(vinyl alcohol) Stabilization of Acrylic Emulsion Polymers Using the Miniemulsion Approach" *Macromolecules*, 2003; 36 (15), p. 5573-5579 ("Kim") is respectfully traversed.

At the outset, *Kim* does not qualify as prior art under 35 U.S.C. § 102(b). The effective filing date of the present application is March 31, 2004 (PCT/JP04/004600), which is within the year of the publication date of *Kim*: July 4, 2003.

The Office alleges that *Kim* discloses (meth)acrylic resin emulsions and methods for producing the same. The Office notes that *Kim* discloses that a PVA is used having a degree

of hydrolysis of 87-89% and a degree of polymerization of 500, which is allegedly within the claimed range. The Office concedes that *Kim* does not disclose a "factor *a*" of at least 0.3 for the emulsions, but alleges that the emulsions of *Kim* would have such a factor *a* because, in the Office's view, the components used to make the emulsions in *Kim* are identical to those of the present claims. The Office's rejection is unsustainable.

At the outset, *Kim* contains no disclosure of any iron compounds that are used as a reaction catalyst:

Table 1. Recipe for the Miniemulsion Polymerization of *n*-Butyl Acrylate and Methyl Methacrylate

ingredient	weight (g)	concentration
deionized water	80.0	
<i>n</i> -butyl acrylate (BA) ^a	0.0-20.0	
methyl methacrylate (MMA) ^a	0.0-20.0	
PVA 205	0.5-4.0	2.5-20 wt % based on monomer
hexadecane (HD)	0.726	3.6 wt % based on monomer
NaHCO ₃	0.007	1 mM based on aqueous phase
ammonium persulfate (APS)	0.018	1 mM based on aqueous phase

^a The weight ratio of total monomers to water always kept at 20/80.

Procedures. a. Miniemulsion Preparation and Polymerization. The recipe used to prepare the various miniemulsions comprising several different formulation components is shown in Table 1. PVA was dissolved by heating at 90 °C for 3 h in deionized water (ca. 6 wt %), and the solution was filtered using a 200 mesh screen. The solids content of the PVA solution was determined gravimetrically and adjusted to 5.9 wt % by adding deionized water.

Miniemulsions Stabilized with HD. A specific amount of HD was mixed with the monomers (BA and MMA). An aqueous PVA solution and DI water were then added to the monomer mixture and stirred for 10 min to prepare a crude emulsion for 10 min prior to subjecting the system to high shear.

Miniemulsions Stabilized with CA. A specific amount of CA was mixed with the PVA solution and DI water and then stirred for 2 h at 70 °C. After cooling, undissolved CA particles were found for the higher amounts of CA (0.833 and 1.744 g). Monomers were added and stirred with a magnetic bar for 24 h to completely dissolve the CA particles and to obtain a good crude emulsion.

The crude emulsions with HD or CA were sonified using a Branson Sonifier (model 450) at a 70% duty cycle and a power setting of 8 for 10 min accompanied by continuous magnetic stirring in an ice bath. All miniemulsion polymerizations were performed in a 500 mL four-neck flask equipped with a reflux condenser, nitrogen gas inlet tube, and Teflon stirrer (~200 rpm) for 24 h at 60 °C.

See page 5575 of *Kim*. On the other hand, the processes for making the presently claimed emulsions have an iron compound present during the emulsification: " i) feeding into a

reactor at an initial stage (*1) an iron compound...*" (see claim 14, emphasis added).

Applicants have demonstrated that this iron compound must be included during polymerization to form an emulsion, especially one having a factor *a* value of at least 0.3.

For example, the discussion of the Example 1 ("E1") process states:

[0068] 750 g of ion-exchanged water and 40 g of PVA-1 (Kuraray's PVA-205 having a degree of polymerization of 500 and a degree of saponification of 88 mol %) were fed into a 2-liter polymerization reactor of glass equipped with a reflux condenser, a thermometer, a nitrogen-introducing duct and an anchor-shaped stirrer, and completely dissolved at 95°C. After cooled to 60°C., 266 g of methyl methacrylate (MMA) and 266 g of butyl acrylate (n-butyl acrylate) (BA) were added to it, and then purged with nitrogen with stirring at 120 rpm. *Next, 0.0058 g of ferrous chloride*, and 25 g of aqueous 10% sodium L(+)-tartrate (TAS) solution were **added to it**.¹

On the other hand, ferrous chloride was not present during the Comparative Example 2 ("CE2") process:

[0083] Aqueous hydrogen peroxide solution was added to the same system *as in Example 1 under the same condition as therein, except that ferrous chloride was not used*. 15 minutes after the start of adding hydrogen peroxide, the system generated heat and its emulsion polymerization started. In this stage, the external temperature around the system was controlled at 50°C., and adding hydrogen peroxide was continued. Since the polymerization temperature reached 65°C., adding hydrogen peroxide was stopped. However, the heat generation did not stop, and the polymerization temperature reached 70°C. Therefore, *since the polymerization control would be impossible*,² the test was stopped.

Therefore, the E1 emulsion and CE2 emulsion were made in the same way except that the iron compound was not included in the process of making the CE2 emulsion. Otherwise, the components and reaction method were the same between the two. As noted in the second half of Table 1 of U.S. '484, the E1 emulsion exhibit a factor *a* of greater than 0.3 (0.5) and a film strength of 145 kg/cm². However, the CE2 emulsion was never obtained because the

¹ [0068] of US '484, in part, emphasis added.

² [0083] of US '484, emphasis added.

"emulsion polymerization uncontrollable, the test stopped". See the second half of Table 1 reproduced in part below:

Polymerization Temperature Profile (° C.)	Results of Emulsion Evaluation						
	Polymerization Stability (g)	Film Strength (kg/cm ²)	Alkali Resistance		Mechanical Stability (%)	Particle Size (μm)	Particle Size Distribution a
			dissolution (%)	swelling (%)			
→ Ex. 1 Co. Ex. 1 Co.	58-62	0.5 Gelled during emulsion polymerization, no emulsion obtained.	145	8 22	0.25	0.8	0.5 →
→ Ex. 2 Co. Ex. 2 Co.	58-62	0.1 Gelled during emulsion polymerization, no emulsion obtained.	155	5 17	0.1	0.5	0.9

The presence of an iron compound (e.g. ferrous chloride) is critical during the claimed processes of making emulsions (claim 14) that exhibit, *inter alia*, factor *a* values of at least 0.3 (claim 1). Therefore, emulsions made of acrylic acid units and methacrylic acid units do not *inherently* exhibit factor *a* values of at least 0.3 as alleged by the Office.

Comparative Example 7 is a process outside the present claims where no iron compound is present. An emulsion is obtained, but the film thereof is "relatively cloudy" (Δ)³ and exhibits a factor *a* value of 0.08, well below those of the present claims ("at least 0.3"—see claim 1). Thus, even when a 50:50 ratio of acrylate:n-butyl acrylate is used (such as what is allegedly used in *Kim*), it is possible to produce a film of an emulsion that exhibits properties outside the claimed properties of the presently claimed emulsions.

As noted by the Applicants, excluding the iron compound results in a polymerization that cannot be controlled and thus no film can be obtained thereby. *Kim* contains no disclosure of any iron compounds included during the processes to make the emulsions. Thus, one of ordinary skill in the art would not be taught how to form the presently claimed emulsions that would have factor *a* values of at least 0.3 based on the disclosure of *Kim*, because this cited reference contains no disclosure of any iron chloride compounds used to make the emulsions. Therefore, *Kim* neither anticipates nor renders obvious the presently claimed emulsions and processes of making the same.

³ See [0078] of US '484 for symbol definitions.

Accordingly, the rejection is no longer tenable and should be withdrawn.

Conclusion

Applicants respectfully submit that the above-identified application is in condition for allowance. Notification thereof is requested.

Respectfully submitted,

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